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books and pamphlets, which are housed in the east wing of the observatory.

The scientific activity of the observatory has lain almost wholly along the lines of the older astronomy of precision, and the chief results of that activity are set forth in the ten volumes of its *Publications.*

MADISON, December, 1896.

SOME LUMINOUS APPEARANCES IN THE SKY.

By W. H. S. MONCK.

In *Nature* for March 28, 1896, appeared an account of a luminous appearance seen in the sky by Dr. BRAUNER, of Prague, on the thirteenth of that month. There were five streaks reaching from the western horizon towards the zenith, apparently not of very long duration. It was only about an hour after sunset, and Dr. BRAUNER ascribed them to some peculiar reflection in the upper regions of the atmosphere. This explanation, however, is not applicable to a similar phenomenon described by Mr. LYON BROWNE, of Shrewsbury, in *Knowledge* for April; for it was seen at 8^h 30^m on the 4th of March, and therefore a considerable time after sunset. It disappeared in the course of ten minutes. It also stretched from the western horizon towards the zenith. Mr. BROWNE thought it might be the zodiacal light, but this seems hardly probable; and the descriptions given do not closely resemble the aurora.

The hypothesis of any peculiar reflection in the upper strata of the atmosphere is more clearly excluded by the following examples of similar phenomena seen in the east after sunset. Captain NOBLE describes one seen by him on the 28th of August, 1883, at 10^h 35^m P.M. "For a moment I thought I was tracing the apparition of a new and most glorious comet." It was seen in the east-northeast. His description appeared in *Knowledge*, and it seems that Mr. W. K. BRADGATE saw an appearance at Liverpool on the same night and in nearly the same direction that Captain NOBLE had seen it in Sussex, but the hour was so much later that it could hardly have been the same object. Then followed an account of a similar appearance seen by Mrs. HARBIN at

Yeovil at 8^h 30^m P.M. on the 21st of September, 1883, also in the east-northeast.

I saw a similar object myself on the 4th of September, 1885. It was in the east or east-northeast, and it was near 11 o'clock P.M. when I saw it. I took it for a very fine meteor-train, and described it as such in a letter to *The Observatory*. But I saw no meteor, and a comparison with the descriptions of Captain NOBLE, Mr. BRADGATE, and Mrs. HARBIN in *Knowledge* led me to conclude that what I had seen was of the same kind. As far as these scanty data go, these appearances seem to occur in spring and autumn, being in the west in spring and in the east in autumn. The resemblance to the tail of a comet presented by them has struck many observers, and I am inclined to think that on certain occasions they have been mistaken for comets' tails.

The first of these which I shall notice occurs in *The Annual Register* for 1761:

"July 18. At a quarter past eleven o'clock at night, a comet was seen off the quarter of His Majesty's ship Princess Royal at the Nore during nearly half a minute, very bright and light, but the clouds being thick obscured it presently. It had a very long tail and appeared to the E. S. E."

A real comet of this magnitude could not have escaped other observers. Clouds, however, seem rather a frequent accompaniment of the kind of phenomenon with which I am dealing.

On the 9th of April, 1894, Mr. EDWIN HOLMES announced that he had discovered a bright comet in the constellation *Draco*. Mr. HOLMES had discovered a comet not very long before, and the resemblance must have been striking in order to deceive him. Unfortunately, I have not the details of his observation at hand, but I have doubt that he mistook one of the appearances on which I have been commenting for a comet. The same remark applies to the discovery of a comet, or rather comet's tail, by Mr. EDDIE at Grahamstown, in South Africa, some time previously, but I do not recollect even the date of this announcement. The failures of astronomers are apt to be speedily forgotten. But clearly they saw something; and I believe both Mr. HOLMES and Mr. EDDIE saw it with the naked eye. That it was not the zodiacal light, or a meteor-train I am convinced; nor do I think that these appearances are explicable as auroras, though that solution seems, on the whole, more probable.

I have not hitherto seen any notice of this phenomenon on the

American continent, and I hope that American observers will keep an eye out for it in future. The great extent of the United States might enable it, if it be an atmospheric phenomenon, to be viewed simultaneously from all sides; while if it presented similar features at distant stations, light would also be thrown on its origin. Possibly, the present paper may lead to the publication of similar observations already made in America. The subject is, I think, worthy of the attention of astronomers. Even if the appearances should prove to be atmospheric, the atmosphere is the medium through which all observations must be made, and it is highly desirable on that account to become acquainted with all its properties. Its influence on the phenomena of lunar eclipses is of a very marked character, and has hardly received adequate consideration; while the twinklings of the stars is believed to be also an atmospheric phenomenon. It is probably owing to this twinkling — certainly to some property of the atmosphere — that stars are often caught by glimpses, and that astronomers have imagined that they saw stars were there were none. The satellites of *Uranus* and the stars in the trapezium of *Orion* form remarkable examples of this. If we could remove the atmosphere, our seeing would be steady.

But the occurrences in the upper portions of the atmosphere are worthy of study on their own account, and astronomers are the persons to study them. A pulsation or flickering, for instance, has often been observed in the tail of a comet. It has been pointed out that this can hardly be real; but if not so, it must indicate the passing of a wave of a peculiar character through the atmosphere. This wave seems to pass from the head of the comet to the end of the tail; and as the tail is pointed towards the Sun, the atmospheric wave must pass in the same direction. Twinkling is perhaps a similar phenomenon which exhibits itself among the stars successively rather than simultaneously — a star nearer to the Sun exhibiting any given phase later than a star more remote from it on the sphere. The condition of the upper strata of the atmosphere may also seriously affect our results in meteoric astronomy; for no meteor can be seen until it has traversed a sufficient quantity of air to change its original extreme cold into intense luminosity. But does such luminosity imply intense heat, or does the rush of the meteor excite some such properties in the air as those which render themselves visible in the aurora? We have a good deal still to learn about our atmosphere, and it may afford a guide to us in dealing with the atmospheres of other bodies.

(TWENTY-SIXTH) AWARD OF THE DONOHOE COMET-MEDAL.

The Comet-Medal of the Astronomical Society of the Pacific has been awarded to Mr. C. D. PERRINE, Assistant Astronomer in the Lick Observatory, for his discovery of an unexpected comet on November 2, 1896.

The Committee on the Comet-Medal,
EDWARD S. HOLDEN,
J. M. SCHAEBERLE,
W. W. CAMPBELL.

1897, January 2.

ELEMENTS AND EPHEMERIS OF COMET *g*, 1896, (PERRINE).

By F. H. SEARES and R. T. CRAWFORD.

From observations made at the Lick Observatory by Mr. C. D. PERRINE on December 8th, 9th, and 10th, we have computed the following elements and ephemeris of Comet *g*, 1896, (PERRINE). The observations were telegraphed to the Students' Observatory by Dr. HOLDEN:—

$$T = 1896 \text{ Nov. } 24.7839 \text{ G. M. T.}$$

$$\left.\begin{aligned} \omega &= 163^\circ\ 38'\ 14'' \\ \Omega &= 243\ \ 41\ \ \ 6 \\ i &= \ 16\ \ 39\ \ 57 \end{aligned}\right\} \text{Mean Equinox of 1896}$$

$$q = 1.15349$$

Representation of middle place—

$$(\text{O—C})\ \Delta\lambda \cos\beta = +5''.5 \qquad \Delta\beta = 0''.0$$

[The ephemeris at four-day intervals from December 13th to 25th is here omitted.] The brightness decreases from 0.91 (December 13th) to 0.59 (December 25th).

STUDENTS' OBSERVATORY,
Berkeley, December 12, 1896.